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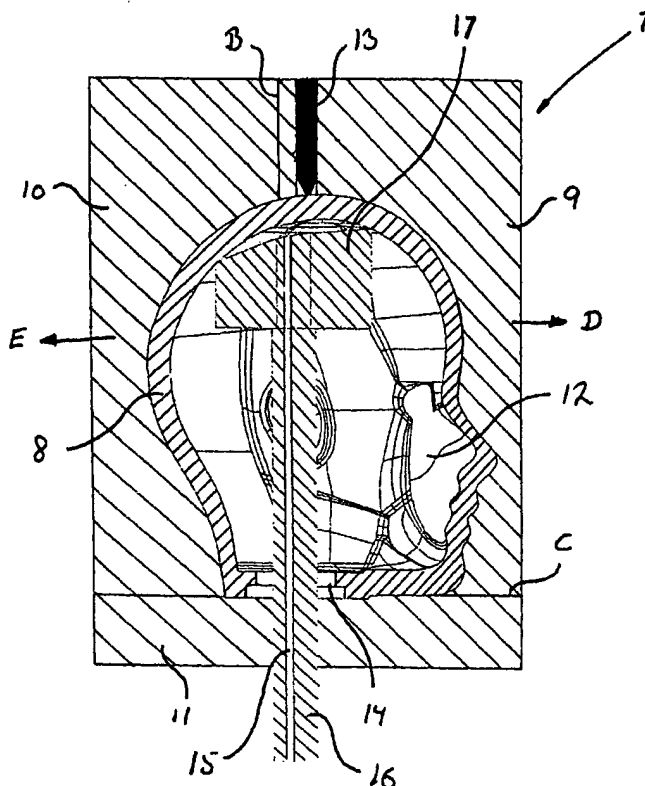
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(54) Title: A DOLL'S HEAD, MANUFACTURE OF A DOLL'S HEAD, AS WELL AS AN APPARATUS FOR EXERCISING THE METHOD



(57) Abstract: The invention relates to a method of manufacturing a doll's head (1) of plastics, and wherein the method uses an injection moulding process, whereby a predetermined amount of plasticised plastics material is introduced into a closed mould cavity in a mould tool (7) via a nozzle (13) in the mould tool, following which the plastics material is cooled within the mould tool (7) that is subsequently opened and the ready-cast head is ejected from the mould. The invention is characterised in that the doll's head (1) is cast as an integral unit comprising both a face portion (3), a scalp (4) and a neck portion (2) in one piece; and that a mould tool is used that comprises a mould core (12, 17) for forming a cavity within the ready-cast doll's head (1), whereby the doll's head (1) is caused to be constituted of a shell, and wherein the mould core is configured and arranged such relative to the remaining mould parts of the mould tool that, by the moulding process alone, it forms an opening to the cavity of the doll's head, which opening is located in the neck portion (2) of the doll's head.

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A DOLL'S HEAD, MANUFACTURE OF A DOLL'S HEAD, AS WELL  
AS AN APPARATUS FOR EXERCISING THE METHOD.

5 The present invention relates to a doll's head made of plastics, a method for  
the manufacture of the doll's head, and a tool for use in the method, and  
wherein the method uses an injection-moulding process, whereby a pre-  
defined amount of plasticised plastics material is introduced into a closed  
mould cavity in a moulding tool, via a nozzle in said mould tool following  
10 which the plastics material is cooled in the mould tool that is subsequently  
opened and the ready-cast head is discharged from the mould.

Today, many configurations of such doll's heads made of plastics are known,  
which doll's heads are manufactured in various shaping processes, such as  
rotational moulding, blow dieing and other methods.

15 Rotational moulding and blow-dieing suffer from the drawback that it is diffi-  
cult to manufacture hollow doll's heads of even wall thickness and elasticity,  
which means that the subsequent processing of such heads, such as inser-  
tion or sewing of hair into the doll's head or optionally painting of the head in  
20 eg a printing process can be rendered difficult.

US patent No 3448540 teaches a doll's head manufactured in an injection-  
moulding process in that the head consists of two separately manufactured  
portions; a first portion comprising the face and neck portion of the doll's  
25 head and a second portion that comprises the scalp. Following manufacture  
of these two portions the scalp is provided with hair that is pinned into the  
scalp and the two head portions are joined by means of mounting means in-  
tended therefor. Thereby it is possible to manufacture the two head portions  
with very accurate wall thicknesses, thereby rendering the subsequent proc-  
30 essing of the head less problematic. There is, however, one problem associ-  
ated with this head that are large number of sub-components are required for  
the assembly of the head, which considerably increases the cost of the head.

In the light of this it is the object of the present invention to provide a doll's head, a method of manufacture and a manufacturing tool whereby the above-described drawbacks of the prior art are completely or partially remedied.

5 In accordance with the invention this is obtained by the doll's head being injection-moulded as an integral unit comprising both a face portion, a scalp and a neck portion in one piece, and in that a moulding tool is used that comprises a mould core for forming a cavity within the ready-cast doll's head, which means that the doll's head is constituted by a shell, and wherein the  
10 mould core is configured and arranged such relative to the other mould parts of the mould tool that - during the moulding process alone - it forms an opening for the cavity of the doll's head, which opening is arranged in the neck portion of the doll's head.

15 Hereby it is possible to form the entire head in one and the same injection-moulding process, while simultaneously ensuring a very accurate wall thickness due to the closed mould within the injection-moulding tool.

In a preferred embodiment whereby it is ensured that it is extremely easy to  
20 sew or insert hair into the scalp of the doll's head, the doll's head is configured such that at least the major part of and preferably the entire scalp is configured as a shell having a substantially even wall thickness.

Embedding or sewing of hair into the scalp of the doll's head can subse-  
25 quently advantageously be carried out following discharge of the doll's head from the moulding tool.

According to an alternative preferred embodiment, the face portion is manu-  
30 factured with a wall thickness that exceeds the wall thickness of the scalp, such that the face becomes relatively rigid and tolerates pressure without significant problems while simultaneously the face upholds a natural appearance when a pressure is exerted on the doll's head with an ensuing elastic deformation.

It is a problem in connection with the manufacture of full, integral, hollow dolls' heads in an injection-moulding process that the core that forms the cavity within the head should advantageously be configured such that it has a smaller cross section at the end where it is attached to the mould compared to the part of the mould core that forms the cavity within the doll's head. According to a preferred embodiment this can be remedied in that the ready-cast doll's head is discharged from the mould by pressurized air or gas being supplied to the cavity within the doll's head through a passage within the mould core, whereby the doll's head is inflated and blown off the mould core, and wherein a plastics material is used that will, during the discharge, be caused to expand elastically sufficiently for the opening in the doll's head to be pulled across the mould core during the discharge and subsequently revert to the desired dimension.

Additionally and advantageously, a stretching force can be applied to the doll's head prior to or simultaneously with the doll's head being inflated and blown off the mould core, by means of a piston arranged within the mould core, which piston is caused to move out of the mould core and press against the inside of the scalp of the doll's head. This will contribute further to ensuring that, during the above-described blowing-off, the doll's head is ejected from the mould core without expanding the scalp and other portions of the head beyond what is strictly necessary.

According to a further aspect of the invention an injection-moulding tool is also provided for the manufacture of doll's heads, which injection-moulding tool comprises a number of form elements that combine to form a closed mould cavity that corresponds to the desired shape of the doll's head, and a nozzle for the introduction of plasticised plastics substance into the form cavity from outside the mould. According to the invention this tool is characterised in that the mould part comprises a first passage on which a free-standing mould core is provided that has an exterior shape that forms a cavity within the doll's head, and in that the mould further comprises external mould parts that form the outer shape on the doll's head, which outer shape comprises a fully integrated head with a face portion, a scalp and a neck

portion, and in that the mould core extends into the outer mould parts and there between such that, when attached onto the first mould part, it forms an opening on the ready-cast head, which opening is located at the neck portion.

5

Additionally, the injection-moulding tool can also advantageously be configured such that the two outer mould parts comprise two mould slots that can be displaced away from each other and away from the mould core, such that the mould core can hereby be exposed for discharge of a ready-cast doll's head, albeit the mould core is undercut and the outer mould parts extend behind the undercut part of the mould core.

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The mould cavity in the injection-moulding tool can also advantageously be configured such that the outer mould on the face part, a part of the scalp and half of the opening at the neck portion in the ready-cast head is formed by the one end of the mould slots.

15

The nozzle for introduction of plasticized plastics substance into the mould cavity can also advantageously be located opposite that end of the mould core that faces farthest away from its point of attachment on the first mould part, such that flowing of plastics substance is achieved within the mould tool which ensures that weakening lines or welding seams do not occur in the ready-cast doll's head.

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A preferred embodiment of the invention will now be described in further detail with reference to the drawing, wherein-

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Figure 1 depicts a doll's head according to the invention, seen in an inclined view from above;

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Figure 2 depicts the doll's head shown in Figure 1, seen in an inclined view from below;

Figure 3 depicts the doll's head shown in Figures 1 and 2, seen in a sectional view at the plane of symmetry of the doll's head.

Figure 4 is an explanatory sketch showing the constructive principles of a tool according to the invention.

Thus, Figures 1 and 2 illustrate the doll's head 1 according to the invention, which head is cast in an injection-moulding tool and in a soft, elastic plastics material, and it comprises - as shown - both a neck portion 2, a face portion 3 and a scalp 4. In accordance with the invention the neck portion has an opening 5 that leads into a cavity 6 within the head 1.

According to the preferred embodiment the head also features a point A at the top of the scalp that is formed by the plasticised plastics material being, in the injection-moulding process, introduced through a nozzle at exactly this point, which will - in the ready-cast head - leave a pip with a non-smooth surface.

Now Figure 3 shows the same head 1 in a sectional view along the plane of symmetry of the head 1, and from here it will appear in particular that the cross sectional dimension within the cavity 6 exceeds the cross sectional dimension of the opening 5 in the neck portion 2, which can - as is well known - be obtained by casting in an injection-moulding process by use of a mould core that has been undercut at the neck portion to provide its shown shape. However, the mould core enables that the scalp 4 can, as shown, be configured with a very even wall thickness, which means that it is easy eg by means of a sewing machine to sew or insert hair into the scalp and that in particular the face portion 3 can be configured with a wall thickness that exceeds the wall thickness of the scalp whereby it is obtained that the face of the doll is relatively rigid, which facilitates a subsequent printing, if any, of eyes and mouth on the doll's head in a mechanical printing process.

Now Figure 4 shows the constructive principles of the injection moulding tool 7 according to the present invention, and wherein the tool is shown as a sec-

tional view through the tool along the plane of symmetry of the cast head, and in a state in which the mould cavity in the tool has just been filled with the plasticised plastics substance 8 that is cooled and in a later process step discharged from the injection-moulding tool 7, following which the cast head is finished.

The figure shows in particular that an injection nozzle 13 is arranged at the top of the one end of the head and the mould core that faces away from the attachment 14 of the mould core 12 to the mould part 11. Hereby the injected plastics substance will flow substantially freely during the injection process and without being divided into partial flows that subsequently converge. Thereby it is avoided that weakening lines or welding seams occur in the ready-cast head 8.

Thus, it will appear from the sketch that the mould tool 7 consists of three mould parts that are separated by the separating lines B and C, whereby the two, slot-mould parts 9 and 10 can be displaced from the shown position and sideways as illustrated by the arrows D and E, such that the mould core 12 arranged on the mould part 11 is exposed with the ready-cast head 8 on its outside.

When the mould core is thus exposed it is possible, via the pressurised-air channel 15 to supply pressurised air that will flow out at the scalp of the ready-cast head, whereby the head is expanded. By a sufficiently high pressure it will thus be possible, in accordance with the invention, to blow the head off the mould core, since in particular the opening 5 on the head 8 that is formed by the attachment 14 of the mould core 12 on the mould part 11, is expanded elastically sufficiently to cause the head to be ejected from the mould core. The ready-cast and discharged head will subsequently, due to the elasticity of the plastics material, revert to its desired shape.

Besides, the mould core is configured with an expeller that comprises and expeller rod 16 and an expeller piston 17 that can be shifted upwards towards the inside of the scalp 4 on the head 8, such that the discharge with



pressurized air can be aided by a simultaneous stretching of the head in a direction away from the attachment 14 of the mould core 12 on the mould portion 11, such that it is ensured to the widest extent possible that the super-atmospheric pressure applied via the pressurised-air passage 15 does  
5 not merely blow up the head without the head being correctly discharged.

Obviously the present invention can be exercised in other ways than those described above and as shown in the drawing. Thus, the doll's head may have other shapes than shown, such as a head for an animal or a fabulous  
10 animal and in a corresponding manner that front portions can be configured in different ways without departing from the fundamental idea behind the invention.

### Claims

1. A method of manufacturing a doll's head from plastics, and wherein the method uses an injection-moulding process, whereby a predetermined amount of plasticised plastics material is introduced into a closed mould cavity in a mould tool, via a nozzle in the mould tool, following which the plastics material is cooled within the mould tool that is subsequently opened and the ready-cast head is discharged from the mould, **characterised** in that the doll's head is cast as an integral unit comprising both a face portion, a scalp and a neck portion in one piece; and in that a mould tool is used that comprises a mould core for forming a cavity within the ready-cast doll's head such that the doll's head is constituted of a shell, and wherein the mould core is configured such relative to the remaining mould portions of the mould tool that, in the casting process alone, it forms an opening to the cavity of the doll's head, which opening is arranged in the neck portion of the doll's head.
2. A method according to claim 1, **characterised** in that at least the major part of and preferably the entire scalp is configured as a shell with a substantially even wall thickness.
3. A method according to claim 1 or 2, **characterised** in that the scalp of the ready-cast doll's head is provided with embedded or sewn-in hair following discharge of the doll's head from the mould tool.
4. A method according to one of the preceding claims, **characterised** in that the face portion is manufactured with a wall thickness that exceeds the wall thickness of the scalp.
5. A method according to any one of the preceding claims, **characterised** in that a mould core is used that has, at that part of the mould core, that forms the opening in the neck of the doll's head, a smaller cross-sectional dimension than the part of the mould core that forms the cavity within the doll's head, and in that the ready-cast doll's head is discharged from the mould core in that, through a passage within the mould core, pressurised air or gas

is supplied to the cavity within the doll's head such that the doll's head is inflated and blown off the mould core- and wherein a plastics material is used that is, during the discharge from the mould, caused to expand elastically sufficiently for the opening in the doll's head to be pulled across the mould  
5 core during discharge and subsequently to revert to the desired dimension.

6. A method according to claim 5, **characterised** in that prior to or simultaneously with the doll's head being inflated and blown off the mould core the doll's head is stretched by means of a piston arranged within the mould core,  
10 which piston is caused to move out of the mould core and press against the inside of the scalp of the doll's head.

7. An injection-moulding tool for the manufacture of doll's heads, which injection-moulding tool comprises a number of mould parts that combine to form a  
15 closed mould cavity that corresponds to the desired shape of the doll's head, and a nozzle for the introduction of plasticised plastics substance into the mould cavity from the mould exterior, **characterised** in that the mould part comprises a first portion on which a free-standing mould core is configured that has an outer shape that forms a cavity within the doll's head; and in that  
20 the mould further comprises outer mould parts that form the outer shape of the doll's head, which outer shape comprises a fully integral head with a face portion, a head portion and a neck portion; and in that the mould core extends into the outer mould parts and there between such that, when attached to the first mould part, it forms an opening on the ready-cast head,  
25 which opening is located at the neck portion.

8. An injection-moulding tool according to claim 7, **characterised** in that the outer mould parts comprise two mould slots that can be displaced away from each other and away from the mould core, such that the mould core can thus  
30 be exposed for discharge of a ready-cast doll's head.

9. An injection moulding tool according to claim 8, **characterised** in that the mould cavity is configured such that the outer shape of the face portion, a

part of the scalp and half of the opening at the neck portion on the ready-cast head are formed by the one of the mould slots.

5 10. An injection moulding tool according to claim 7, 8 or 9, **characterised** in that the mould core is undercut when attached to the first mould part, so as to exhibit a smaller cross-sectional dimension at its point of attachment to the first mould part compared to the corresponding cross-sectional dimension farther away from this point; and that - within the mould core - passages are configured for supplying pressurized air to the inside of the ready-cast head  
10 with a view to inflating the head and discharging same from the mould core.

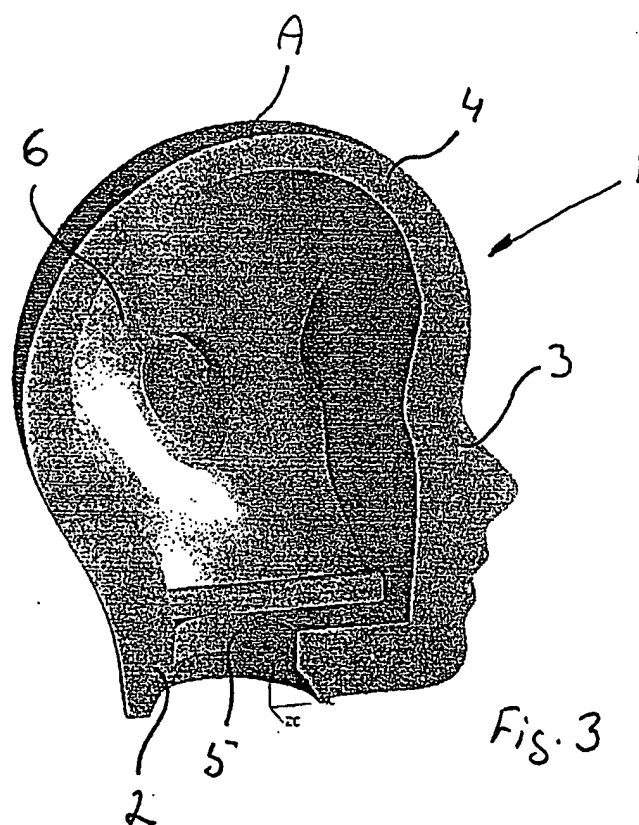
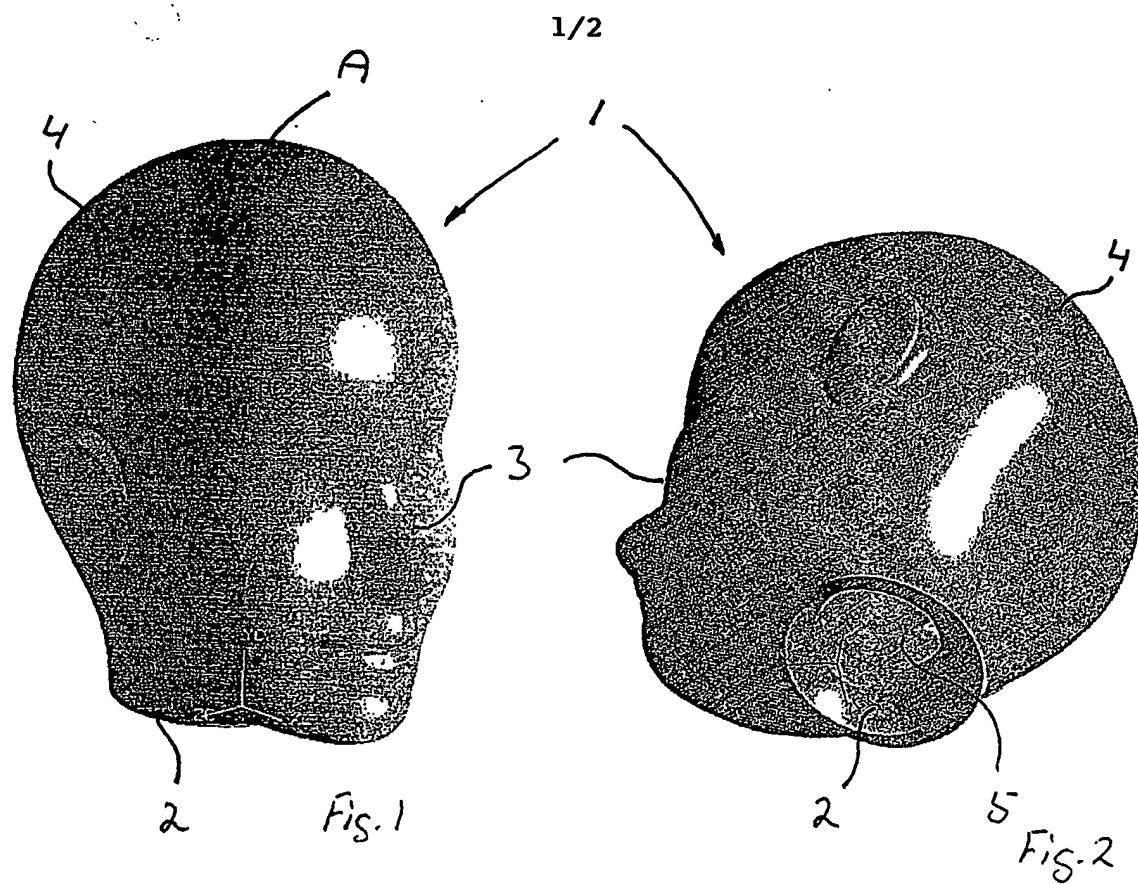
11. An injection-moulding tool according to claim 10, **characterised** in that - within the mould core - an expeller is provided that can be shifted out of that part of the mould core that faces away from the point of attachment of the  
15 mould core on the first mould part.

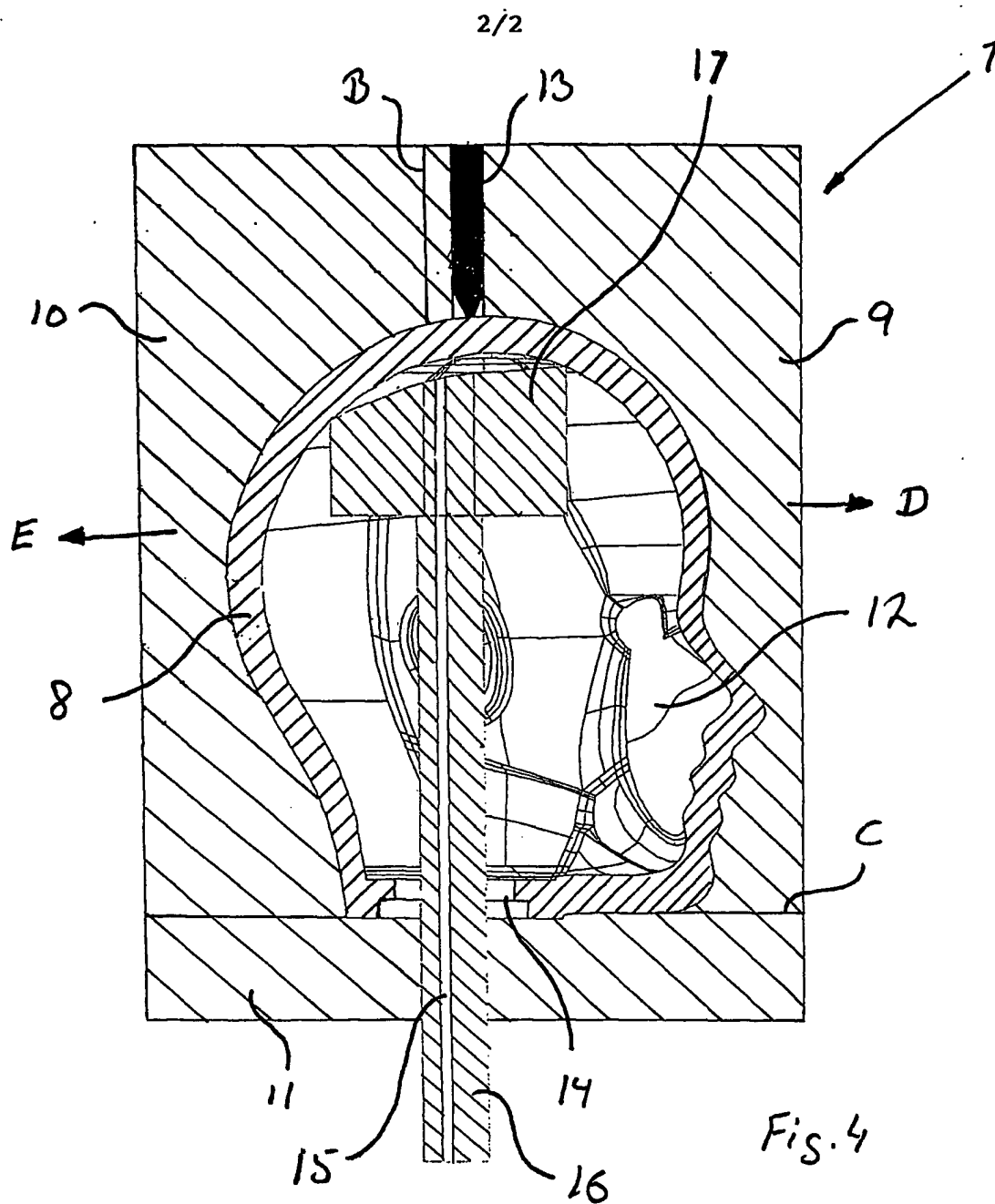
12. An injection-moulding tool according to one of claims 7 through 11, **characterised** in that the nozzle for introduction of plasticised plastics substance into the mould cavity is arranged opposite that end of the mould core that  
20 faces farthest away from the point of attachment of same on the first mould part.

13. A doll's head made of plastics, **characterised** in that it is cast integrally in an injection moulding process and comprises at least a face portion, a scalp and a neck portion- and that it comprises an opening at the neck portion,  
25 which opening provides access to a cavity within the head interior.

14. A doll's head according to claim 13, **characterised** in that the scalp on the head is configured as a shell having a substantially uniform wall thickness.  
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15. A doll's head according to claim 14, **characterised** in that the face portion is configured as a shell with a wall thickness that exceeds the wall thickness of the scalp.





## INTERNATIONAL SEARCH REPORT

International application No.

PCT/DK 01/00282

## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2105810 A (F FENTON ET AL), 18 January 1938 (18.01.38), column 2, line 32 - line 55, figures 11-12  -----	1-15

**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

02/08/01

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